OBSERVING HIGHLIGHTS for January 17 to February 2, 2024, a "bright" Moon period.
Black Canyon Astronomical Society (BCAS), western Colorado, USA

SUMMARY. Nearing the midpoint of Colorado's winter, our days are now lengthening and our nights shortening, if just a bit. As twilight fades, during this "bright Moon" period, Jupiter is a beacon high above the southern horizon. The Giant Planet remains visible for most of the night, setting in the west after midnight (MST). With a telescope, you can watch the shadows of Jupiter's large moons cross the Giant Planet (see details in text under "JUPITER…"). Before twilight ends, Saturn becomes visible about 20 degrees above the southwestern horizon and sets in the west southwest after 7:15 PM MST. Venus is still a brilliant "morning star", rising in a dark sky before 5:35 AM MST. Spot Mercury low in the east southeast during morning twilight from January 17 to about January 27 between about 6:20 and 6:40 AM MST. On January 27 Mercury is in conjunction with fainter Mars. Using binoculars on January 27 at about 6:31 AM MST from western Colorado, challenge yourself to find Mars, which may be visible less than half a degree below brighter Mercury (you will need an unobstructed east-southeastern horizon, as the planetary duo will be only 2 degrees above a flat horizon with the Sun still about 10 degrees below the horizon). As it slowly emerges from glaring twilight, this may be our first chance to see Mars during its 2024-2025 appearance. Do not look for these planets after sunrise – the Sun can be dangerous to your eyes.

The Moon is at first quarter on January 17. From January 18 to 24, watch a gibbous Moon wax. The Moon is full on January 25. From January 26 to February 1, we can watch a gibbous Moon wane. The Moon reaches last quarter on February 2. On the evening of January 17, the first quarter Moon is about 8 degrees west of Jupiter. On the evening of January 18, the gibbous Moon appears about 5 degrees above and east of Jupiter.

The Sun has been impressively active recently. An extreme (X-class) solar flare that occurred on December 31 was the most energetic flare of the current solar cycle. There are currently many sunspots within active regions, and we may expect frequent solar flares and coronal mass ejections of charged particles. You can monitor solar activity safely in real time on the internet. High solar activity is triggering auroras (aka "northern lights") and airglow, which have been photographed and seen from Colorado in the past several months. So, keep watch for more of these phenomena! If auroras are not visible from Colorado, you can view them online in real time from more northerly locations.

From western Colorado, there are evening passes of the bright International Space Station (ISS) from January 16 to 21 and from January 26 to February 2. And there are evening passes of the almost-as-bright Tiangong (Chinese) Space Station from January 16 to 22 and a morning Tiangong pass on February 2. "Trains" of 23 satellites in Starlink Group 6-37 (just launched on Jan 14) may be visible on the evenings of January 16 and 17.

WESTERN SLOPE SKIES. Since 2011, BCAS and KVNF Community Radio have been producing Western Slope Skies (WSS), a biweekly astronomy feature, which airs every two weeks at about 8:10 AM on Fridays and 7:00 PM on Wednesdays. On January 19 and 24, Kaila Harward, an astronomy student of Dr. Catherine Whiting at Colorado Mesa University, will present "Traveling Through Time with a Telescope."

Note: The apparent brightness of sky objects is measured in "magnitude" units. Many bright stars are magnitude +1, while the faintest stars easily visible to unaided eyes under dark skies are magnitude +6. Some of the brightest stars are 0 magnitude (e.g., Vega, Arcturus), while the brightest sky objects have negative magnitudes (e.g., Sirius at -1.5, Jupiter at -2 to -3, Venus at -4 to -5, the full Moon at -12 to -13, and the Sun at -26.7 magnitude). Angular distances on the sky are usually cited in degrees of arc. Helpful ways to estimate 1, 5, 10, 15, and 25 degrees of arc can be found here: https://www.timeanddate.com/astronomy/measuring-the-sky-by-hand.html

THE MOON. The Moon is at **first quarter on January 17** (exactly at 8:52 PM MST). From January 18 to 24, we can watch a gibbous Moon wax. **The Moon is full on January 25** (exactly full at 10:54 AM MST). On evenings from January 26 to February 1, we can watch a gibbous Moon wane. The Moon reaches **last quarter on February 2** (exactly at 4:18 PM MST). On the evening of January 17, the first quarter Moon is about 8 degrees west of Jupiter. On the evening of January 18, the 60%-illuminated, gibbous Moon appears about 5 degrees above and east of Jupiter. NASA has published a stunning visualization of lunar phases for year 2024.

COMET 62P/TSUCHINSHAN. Comet 62P/Tsuchinshan is in northwestern Virgo during this period. Comet 62P is brighter than predicted, but it's starting to fade as it moves away from both the Sun and the Earth. It may appear as a gray "fuzzball", and larger apertures and imaging may show a distinct green color and a straight ion tail.

SATURN IN THE EARLY EVENING. As evening twilight fades, Saturn is about 20 degrees above the southwestern horizon. Then the Ringed Planet descends toward the west-southwestern horizon setting at about 8:18 PM MST on January 17 and 7:24 PM MST on February 2. Between January 17 and February 2, Saturn shines at magnitude +1.0, as its distance from Earth increases a bit from 976 to 988 million miles. Telescopes of any size will reveal Saturn's stunning rings. Saturn's disk now appears 16 arc seconds wide, and its rings span 36 arc seconds. This period will be our last decent chance to observe Saturn substantially above the horizon, until the Ringed Planet reappears in the morning sky in April. With a telescope or high-magnification binoculars, it's possible to spot Titan, Saturn's largest moon. Telescopes with apertures of 6 inches or larger may reveal several other moons of the Ringed Planet. From Earth's perspective during 2024, Saturn's rings are less inclined than they have been during the past several years, so they may appear less impressive in telescopes. These thin rings will appear nearly edge-on and almost disappear during 2025, so view Saturn telescopically soon. Because Saturn's rings now appear less inclined, and therefore dimmer than in past years, it may be easier to spot some of Saturn's mid-sized moons through telescopes. You can follow the changing positions of Saturn's moons by referring to various planetarium apps and/or this site:
https://skyandtelescope.org/observing/interactive-sky-watching-tools/saturns-moons-javascript-utility/

JUPITER: BRIGHT FOR MUCH OF THE NIGHT. Soon after sunset, look for Jupiter, shining brightly, about 60 degrees above the southern horizon. Between January 17 and February 2, the Giant Planet fades slightly (from magnitude -2.45 to -2.33), as its distance from Earth increases from 440 to 465 million miles. Jupiter sets in the west northwest at about 1:26 AM MST on January 17 and at about 12:28 AM MST on February 2. Through telescopes or binoculars, the Giant Planet's apparent equatorial diameter decreases from 41.7 to 39.5 arc seconds during this period. Use a telescope or binoculars to spot Jupiter's four bright moons. You can identify them by their changing positions and referring to various planetarium apps or this website:
https://skyandtelescope.org/wp-content/plugins/observing-tools/jupiter_moons/jupiter.html
If you have a telescope, try viewing shadow transits (Jovian solar eclipses!) of Jupiter's moons on the nights listed below. Ganymede, the largest moon in the Solar System, casts the largest shadow of Jupiter's moons, and its shadow is usually the easiest to spot crossing the Giant Planet. However, there are no transits of Ganymede's shadow that are visible from the Western Slope during this period. Europa's small shadow can be challenging to spot. Io's shadow is larger than Europa's but smaller than Ganymede's shadow. Callisto's shadow does not cross Jupiter during this period.

January 19 to 20, 2024, 11:42 PM to 1:56 AM MST, Io's shadow crosses Jupiter (Locally, Jupiter sets at about 1:15 AM MST. Jupiter will be only 17 deg above the western horizon at the start of this event and will set during the transit.)

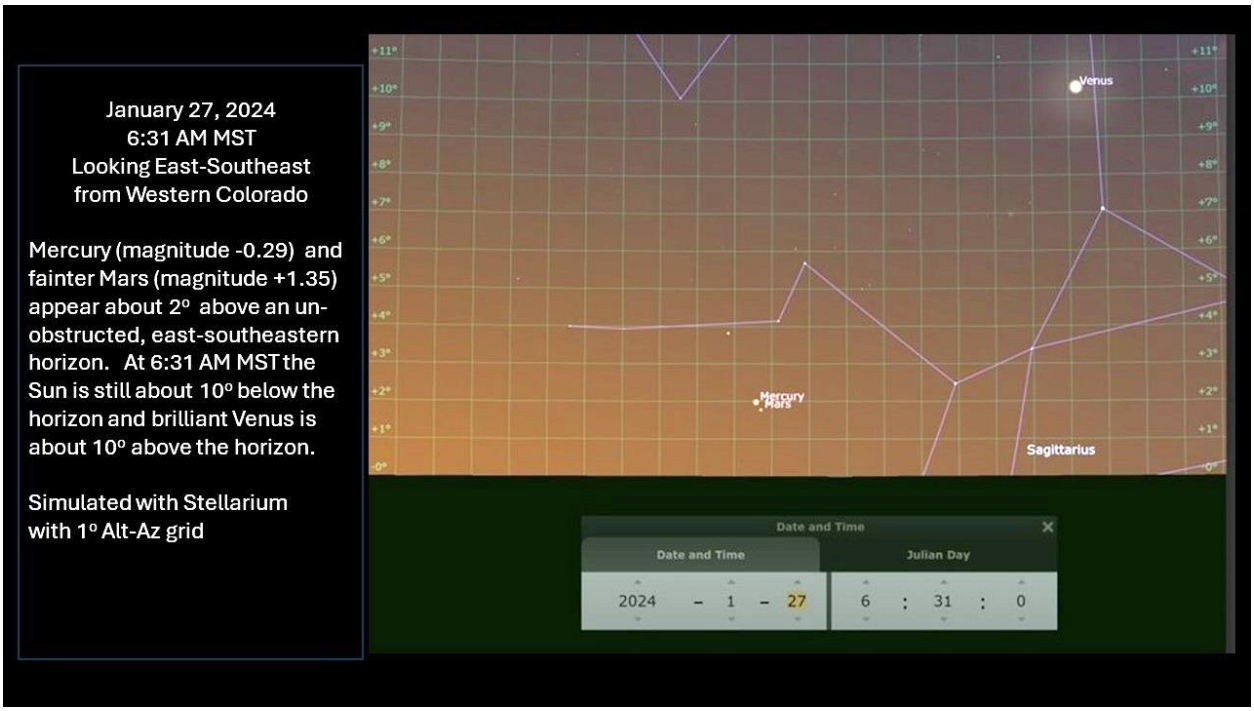
January 20 to 21, 2024, 10:54 PM to 1:12 AM MST, Europa's shadow crosses Jupiter (Locally Jupiter sets at about 1:12 AM MST at the end of the transit).

January 21, 2024, 6:12 PM to 8:24 PM MST, Io's shadow crosses Jupiter (Locally the Sun sets at about 5:22 PM MST).

January 28, 2024, 8:08 to 10:20 PM MST, Io's shadow crosses Jupiter.

VENUS – RISING LATER, BUT STILL A BRILLIANT "MORNING STAR"! Venus is still a beacon in the east-southeastern, predawn sky, rising before morning twilight, at about 5:08 AM MST on January 17 and 5:31 AM MST on February 2. Morning-by-morning Venus rises later, as its angular separation from the Sun continues to decrease. Venus is still brilliant but continues to fade a bit (from magnitude -3.98 to -3.94) between January 17 and February 2, as its distance from Earth increases from 119 to 127 million miles and its apparent diameter (as seen through telescopes) decreases from 13.1 to 12.2 arc seconds. Use a telescope to watch Venus' gibbous phase wax from 82% to 86% illuminated between January 17 and February 2. **Please do your Venus spotting before sunrise. NEVER chance looking at the Sun directly; serious eye damage can result.**

MERCURY MEETS MARS IN MORNING TWILIGHT. On January 17 at 6:39 AM MST, Mercury, shining at magnitude -0.23 in morning twilight, is about 6 degrees above the southeastern horizon (with the Sun about 10 degrees below that horizon). Morning-by-morning, Mercury's angular separation from the Sun decreases and it becomes immersed in brighter twilight. From western Colorado on January 27 at about 6:31 AM MST (with the Sun 10 degrees below the horizon), challenge yourself to spot Mercury (at magnitude -0.29) about two degrees above the east-southeastern horizon and less than half a degree above and left from fainter Mars (magnitude +1.35). As it slowly emerges from morning twilight, this may be our first chance to see Mars during its 2024-2025 appearance. But to see this planetary conjunction, you need an unobstructed east-southeastern horizon and clear, transparent skies. On January 27 Mars is more than 4 times fainter than Mercury, and you likely will need binoculars to spot Mars (see chart, below). Not long after January 27, Mercury becomes lost in bright morning twilight, as it moves toward its solar conjunction in late February. Between January 17 and 27, Mercury's distance from Earth increases from 102 to 116 million miles, as its gibbous disk waxes from 73% to 84% illuminated. Although Mars appears close to Mercury on January 27, the Red Planet is 217 million miles from Earth, well beyond Mercury. Mercury's apparent diameter (as seen through telescopes) decreases from 6.1 to 5.4 arc seconds during this period, and Mars' apparent diameter is only 4.0 arc seconds. **Please do your Mercury and Mars spotting before sunrise. NEVER chance looking at the Sun directly; serious eye damage can result.**



THE SUN. The Sun has been impressively active in the past year. M-class ("moderate") solar flares have been occurring most weeks, and X-class ("extreme") flares occurred on January 5, 9, 10, February 11, 17, March 3, 29, June 20, July 2, August 5 and 7, and December 14 and 31, 2023 (an X5 flare that occurred on December 31 was the strongest of the current solar cycle). There also have been many coronal mass ejections ("CMEs") of charged particles that have triggered auroras. Airglow also results from high solar activity, and this phenomenon has been photographed and observed from Colorado. As of January 16, there are many sunspots and active regions on the Earth-facing side of the Sun. M- and X-class solar flares are likely during this period. Some flares may be associated with CMEs. You can monitor sunspots, solar flares, CMEs, and other solar activity safely and in "real time" at the following sites:
https://sdo.gsfc.nasa.gov/data/
https://stereo.gsfc.nasa.gov/beacon/
http://halpha.nso.edu/
https://www.swpc.noaa.gov/
https://sohowww.nascom.nasa.gov/data/realtime-images.html
http://www.sidc.be/silso/ssngraphics
Do not look at the Sun directly without safe, specialized solar filters. Looking at the Sun can be very dangerous unless you take adequate precautions. Severe eye damage and even blindness can result.

AURORAS (aka "polar lights" or "northern lights"). It can be challenging to spot auroras from Colorado's mid-northern latitudes, but in the past year auroras were photographed and seen from Colorado and even farther south in Arizona! Solar magnetic storms, when directed toward Earth, can cause auroras. With current, high solar activity, chances for auroras are good. You can get predictions and updates for auroras, their intensity, and geographic extent from NOAA's Space Weather Prediction Center:
https://www.swpc.noaa.gov/.
https://www.swpc.noaa.gov/products/aurora-viewline-tonight-and-tomorrow-night-experimental

We can watch aurora in real-time from Yellowknife, Northwest Territories on an all-sky camera at the Canadian Space Agency's AuroraMax website. After "prolonged technical difficulties" this season, AuroraMax has now been restored. Like Colorado, Yellowknife is in the Mountain Time Zone. Other aurora webcams are also operating. See this review article…
https://www.space.com/northern-lights-webcams-watch-aurora-online
Here's a link to another aurora webcam in the Mountain Time Zone, at Banff, Alberta, Canada…
https://www.youtube.com/watch?v=2zt8AUDH8Us
An aurora webcam at the University of Alaska-Fairbanks is two hours behind the Mountain Time Zone…
https://www.youtube.com/watch?v=O52zDyxg5QI

EARTH SATELLITE HIGHLIGHTS. The following predictions are for western Colorado, specifically Montrose, in Mountain Standard Time (MST). Numerous Earth satellites are visible every clear night. Brighter satellites have smaller magnitude numbers, and the brightest (e.g., the International and Tiangong Space Stations) may have negative magnitudes. These predictions are for selected passes of some bright and/or interesting satellites (as summarized from Heavens-Above.com). Satellite orbits can change. These predictions for satellite passes may be inaccurate by up to several minutes, especially after January 21. For more accurate predictions of these and other satellites, check Heavens-Above.com or other satellite prediction sites for updates on the nights you wish to observe. Be sure to set application(s) for your location and time zone.

Starlink satellite "trains", when viewed from less than 1 day to about 4 days after launch, can be very eye-catching! Check Heavens-Above.com (or other sites) for updated, local predictions of "trains" of Starlink satellites. Starlink satellites are launched often, typically once or twice per week.

January 16, 2024. International Space Station (ISS). 6:32 to 6:35 to 6:37 PM MST. WSW to NW to NE. Max altitude 61 deg above NW, disappears into Earth's shadow at 29 deg above NE, max magnitude -3.5 (Passing through Aquarius, Pegasus, Cassiopeia, and Camelopardalis/Ursa Major). **Predictions for the ISS are subject to change due to orbital adjustments. Check for updated predictions.**

January 16, 2024. Starlink Group 6-37. 6:54 to 6:57 PM MST. WNW to WSW. Train of 23 Starlink satellites, disappearing into Earth's shadow at max altitude 38 degrees above WSW. Estimated max magnitude +3.6. (Passing through Delphinus, Pegasus, and Pisces. The 23 satellites are still closely grouped; they are starting to boost to operational orbits after their launch on January 14 at 6:52 PM MST. Pass may occur a minute or two later than predicted above).

January 16, 2024. Tiangong (Chinese Space Station). 6:59 to 7:02 PM MST. WNW to NW, disappears into Earth's shadow at max altitude 48 deg above NW, max magnitude -1.5 (Passing through Cygnus and Cepheus). **Tiangong's orbit may change frequently. Check for updates.**

January 17, 2024. International Space Station (ISS). 5:44 to 5:47 to 5:51 PM MST. (1st PM ISS Pass on January 17. SW to SE to NE. Max altitude 74 deg above SE, disappears into Earth's shadow 8 deg above NE, max magnitude -3.7 (Passing through Aquarius, Pisces, Aries, Perseus, Auriga, and Lynx/Gemini). **Predictions for the ISS are subject to change due to orbital adjustments. Check for updated predictions.**

January 17, 2024. Tiangong (Chinese Space Station). 5:59 to 6:02 to 6:05 PM MST (1st PM Tiangong pass of January 17). WNW to N to E, max altitude 48 deg above N, disappears into Earth's shadow 14

deg above E, max magnitude -1.7 (Passing through Cygnus, Cepheus, Camelopardalis, and Gemini). **Tiangong's orbit may change frequently. Check for updates.**

January 17, 2024. Starlink Group 6-37. 6:55 to 7:03 PM MST. W to SSW. Train of 23 Starlink satellites, disappearing into Earth's shadow at max altitude 21 degrees above SSW. Estimated max magnitude +4.5. (Passing through Delphinus, Aquarius-near Saturn, and Cetus/Sculptor. These 23 satellites are still closely grouped; they are starting to boost to operational orbits after their launch on January 14 at 6:52 PM MST. Pass may occur 1 to 3 minutes than predicted above).

January 17, 2024. International Space Station (ISS). 7:22 to 7:24 PM MST. (2nd PM ISS pass on January 17). WNW to NW. Disappears into Earth's shadow at max altitude 17 deg above NW, max magnitude -1.3 (Passing through Delphinus, Vulpecula, and Cygnus). **Predictions for the ISS are subject to change due to orbital adjustments. Check for updated predictions.**

January 17, 2024. Tiangong (Chinese Space Station). 7:36 to 7:37 PM MST (2nd PM Tiangong Pass of January 17). WNW to W, disappears into Earth's shadow at max altitude 18 deg above W, max magnitude +0.7 (Passing Delphinus and Pegasus). **Tiangong's orbit may change frequently. Check for updates.**

January 18, 2024. International Space Station (ISS). 6:33 to 6:36 to 6:38 PM MST. W to NNW to NNE. Max altitude 25 deg above NNW, disappears into Earth's shadow at 17 deg above NNE, max magnitude -2.0 (Passing through Delphinus, Vulpecula, Cygnus, Draco, Ursa Minor, and Draco again). **ISS and Tiangong may be visible in sky at same time! Predictions for the ISS are subject to change due to orbital adjustments. Check for updated predictions.**

January 18, 2024. Tiangong (Chinese Space Station). 6:36 to 7:40 to 7:41 PM MST. WNW to NNE to E. Max altitude 83 deg above NNE, disappears into Earth's shadow 42 deg above E, max magnitude -2.3 (Passing Cygnus, Lacerta, Perseus, and Taurus). **Tiangong and ISS may be visible in sky at same time! Tiangong's orbit may change frequently. Check for updates.**

January 19, 2024. International Space Station (ISS). 5**:45 to 5:48 to 5:51 PM MST. (1st PM ISS pass of January 19).** WSW to NNW to NE. Max altitude 37 deg above NNW, disappears into Earth's shadow 6 deg above NE, max magnitude -2.6 (Passing through Delphinus, Vulpecula, Cygnus, Draco, Ursa Minor, and Ursa Major). **Predictions for the ISS are subject to change due to orbital adjustments. Check for updated predictions.**

January 19, 2024. Tiangong (Chinese Space Station). 7:14 to 7:17 PM MST. W to SW. Disappears into Earth's shadow at max altitude 34 deg above SW, max magnitude -0.6 (Passing Delphinus, Pegasus, Pisces, and Cetus). **Tiangong's orbit may change frequently. Check for updates.**

January 19, 2024. International Space Station (ISS). 7:24 to 7:25 PM MST. (2nd PM ISS pass of January 19). WNW to NNW. Disappears into Earth's shadow max altitude at 11deg above NNW, max magnitude -0.8 (Passing through Vulpecula, Cygnus and Draco). **Predictions for the ISS are subject to change due to orbital adjustments. Check for updated predictions.**

January 20, 2024. Tiangong (Chinese Space Station). 6:16 to 6:20 to 6:23 PM MST. WNW to SSW to ESE, Max altitude 60 deg above SSW, disappears into Earth's shadow 11 deg above ESE, max magnitude

-1.7 (Passing Sagitta, Pegasus, Pisces, Cetus, Eridanus, and Lepus). **Tiangong's orbit may change frequently. Check for updates.**

January 20, 2024. International Space Station (ISS). 6:35 to 6:37 to 6:39 PM MST. NW to NNW to N. Max altitude 14 deg above NNW, disappears into Earth's shadow at 11 deg above N, max magnitude -1.3 (Passing through Sagitta, Cygnus, and Draco). **Predictions for the ISS are subject to change due to orbital adjustments. Check for updated predictions.**

January 21, 2024. International Space Station (ISS). 5:47 to 5:49 to 5:52 PM MST. WNW to NNW to NNE. Max altitude 18 deg above NNW, max magnitude -1.6 (Passing through Aquila, Lyra, Draco, and Ursa Major-Big Dipper). **Predictions for the ISS are subject to change due to orbital adjustments. Check for updated predictions.**

January 21, 2024. Tiangong (Chinese Space Station). 6:56 to 6:59 to 7:01 PM MST. W to SSW to SSE, Max altitude 20 deg above SSW, disappears into Earth's shadow 11 deg above SSE, max magnitude +0.4 (Passing Equuleus, Aquarius, Cetus/Sculptor, Fornax, and Eridanus). **Tiangong's orbit may change frequently. Check for updates.**

January 22, 2024. Tiangong (Chinese Space Station). 5:58 to 6:02 to 6:04 PM MST. W to SSW to SE, Max altitude 32 deg above SSW, max magnitude -0.3 (Passing Aquila, Equuleus, Aquarius, Cetus, and Eridanus). **Tiangong's orbit may change frequently. Check for updates.**

January 26, 2024. International Space Station (ISS). 6:40 to 6:41 PM MST. N to NNE. Disappears into Earth's shadow at max altitude 10 deg above NNE, max magnitude -1.3 (Passing through Lyra and Draco). **Predictions for the ISS are subject to change due to orbital adjustments. Check for updated predictions.**

January 27, 2024. International Space Station (ISS). 7:26 to 7:27 PM MST. In NNW. Disappears into Earth's shadow at max altitude 12 deg above NNW, max magnitude -1.0 (Passing through Cygnus and Draco). **Predictions for the ISS are subject to change due to orbital adjustments. Check for updated predictions.**

January 28, 2024. International Space Station (ISS). 6:38 to 6:41 PM MST. NNW to NNE. Disappears into Earth' shadow at max altitude 15 deg above NNE, max magnitude -1.8 (Passing through Lyra, Draco, and Ursa Major-Big Dipper). **Predictions for the ISS are subject to change due to orbital adjustments. Check for updated predictions.**

January 29, 2024. International Space Station (ISS). 7:26 to 7:28 PM MST. NW to NNW. Disappears into Earth's shadow at max altitude 22 deg above NNW, max magnitude -1.8 (Passing through Cygnus and Draco/Cepheus). **Predictions for the ISS are subject to change due to orbital adjustments. Check for updated predictions.**

January 30, 2024. International Space Station (ISS). 6:38 to 6:41 to 6:42 PM MST. NNW to NNE to NE. Max altitude 29 deg above NNE, disappears into Earth's shadow 26 deg above NE, max magnitude -2.7 (Passing through Lyra, Draco, Ursa Minor, Draco again, and Ursa Major). **Predictions for the ISS are subject to change due to orbital adjustments. Check for updated predictions.**

January 31, 2024. International Space Station (ISS). 7:26 to 7:29 PM MST. WNW to W. Disappears into Earth's shadow at max altitude 59 deg above W, max magnitude -2.9 (Passing through Cygnus and Pegasus). **Predictions for the ISS are subject to change due to orbital adjustments. Check for updated predictions.**

February 1, 2024. International Space Station (ISS). 6:38 to 6:41 to 6:44 PM MST. NW to NE to ESE. Max altitude 76 deg above NE, disappears into Earth's shadow 19 deg above ESE, max magnitude -3.9 (Passing through Cygnus, Cepheus, Cassiopeia, Perseus, Auriga, Taurus, Orion, and Monoceros). **Predictions for the ISS are subject to change due to orbital adjustments. Check for updated predictions.**

February 2, 2024. Tiangong (Chinese Space Station). 6:29 to 6:31 to 6:34 AM MST. S to SE to ESE, Max altitude 16 deg above SE, max magnitude +1.0 (Passing Centaurus, Scorpius, and Sagittarius-near Venus). **Tiangong's orbit may change frequently. Check for updates.**

February 2, 2024. International Space Station (ISS). 7:27 to 7:29 to 7:31 PM MST. W to SW to S. Max altitude 18 deg above SW, disappears into Earth's shadow 12 deg above S, max magnitude -1.1 (Passing through Pegasus, Pisces, Cetus, Fornax, and Eridanus). **Predictions for the ISS are subject to change due to orbital adjustments. Check for updated predictions.**

HAPPY OBSERVING!